WE CLAIM:

1. A method for highly sensitive imaging, comprising:

forming a first well of a first polarity type wherein the first well is formed on an epitaxial layer of the first polarity type such that an intervening epitaxial material of the first polarity type exists between adjacent walls of the first well; and

forming a diode electrode structure of a second polarity type that is opposite the first polarity type wherein the diode electrode structure is one of an active diffusion layer of the second polarity formed on the intervening epitaxial material and a second well of the second polarity type formed within the intervening epitaxial material wherein the diode electrode structure is formed such that a first portion of the intervening epitaxial material is between the electrode structure and the first well.

2. The method of claim 1, further comprising minimizing the capacitance of the diode electrode structure in accordance with the equation:

$$S \propto A_{eff} \cdot QE_{optimized} \cdot \frac{q}{C_{\min imized}}$$

where $S$ is the sensitivity of a pixel, $A_{eff}$ is the effective photosensitive area of the pixel, $QE$ is the quantum efficiency of the pixel, $q$ is the charge of an electron, and $C$ is the capacitance of the diode structure.

3. The method of claim 1, further comprising applying a bias voltage across the first well and the diode electrode structure.

4. The method of claim 3, further comprising exposing a top surface of the intervening epitaxial material to light.

5. The method of claim 1, wherein the top surface of the intervening epitaxial material forms a continuous area surrounding the electrode structure.

6. The method of claim 1, wherein the intervening epitaxial material is contained within the first well.

7. The method of claim 1, wherein the epitaxial layer is formed on a P+ substrate.

8. An imaging pixel, comprising:

a first well of a first polarity type wherein the first well is formed on an epitaxial layer of the first polarity type such that an intervening epitaxial material of the first polarity type exists between adjacent walls of the first well; and

a diode electrode structure of a second polarity type that is opposite the first polarity type wherein the diode electrode structure is one of an active diffusion layer of the second polarity formed on the intervening epitaxial material and a second well of the second polarity type formed within the intervening epitaxial material wherein the diode electrode structure is formed such that a first portion of the intervening epitaxial material is between the electrode structure and the first well.

9. The pixel of claim 8, wherein the intervening epitaxial material extends upwards to a level that is substantially the same as the top surface of the first well.

10. The pixel of claim 8, further comprising terminals that are configured to apply a bias voltage across the first well and the diode electrode structure.

11. The pixel of claim 8, further comprising a reset transistor that is configured to set an initial voltage across the first well and the diode electrode structure.

12. The pixel of claim 8, wherein the top surface of the intervening epitaxial material forms a continuous area surrounding the electrode structure.

13. The pixel of claim 8, wherein the intervening epitaxial material is contained within the first well.

14. The pixel of claim 8, wherein the epitaxial layer overlies a P+ substrate.

15. An imaging pixel, comprising:

a first well means of a first polarity type wherein the first well means is formed on an epitaxial layer of the first polarity type such that an intervening epitaxial material of the first polarity type exists between adjacent walls of the first well means; and

a diode electrode means of a second polarity type that is opposite the first polarity type wherein the diode electrode means is one of an active diffusion layer of the second polarity formed on the intervening epitaxial material and a second well means of the second polarity type formed within the intervening epitaxial material wherein the diode electrode means is formed such that a first portion of the intervening epitaxial material is between the electrode structure and the first well means.

16. The pixel of claim 15, wherein the intervening epitaxial material extends upwards to a level that is substantially the same as the top surface of the first well means.

17. The pixel of claim 16, further comprising terminals that are configured to apply a bias voltage across the first well means and the diode electrode structure.

18. The pixel of claim 15, wherein the top surface of the intervening epitaxial material forms a continuous area surrounding the electrode structure.

19. The pixel of claim 15, wherein the intervening epitaxial material is contained within the first well means.

20. The pixel of claim 15, wherein the epitaxial layer overlies a P+ substrate.